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THE EASTERN PALEARCTIC RELATIVES OF EUROPEAN *DERAEOCORIS OLIVACEUS* (FABRICIUS) (HETEROPTERA: MIRIDAE)*

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The eastern Palearctic deraeocorine plant bugs which have been incorrectly considered conspecific with the European *Deraeocoris olivaceus* (Fabricius) are revised. *Deraeocoris brachialis* Stål, which has been regarded as a synonym of *olivaceus*, is reinstated as valid, diagnosed and redescribed. Two new species, *D. gibbantennatus* from the Primorskij Kraj, Russia and *D. erythromelas* from Shikoku and Kyushu, south-western Japan, are diagnosed and described. The European 'true' *D. olivaceus* is diagnosed, and a key to the species is provided. The zoogeography of the four allied species is discussed.

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Key words. – Heteroptera; Miridae; revision; *Deraeocoris olivaceus*; *D. brachialis*; new species; key; zoogeography.

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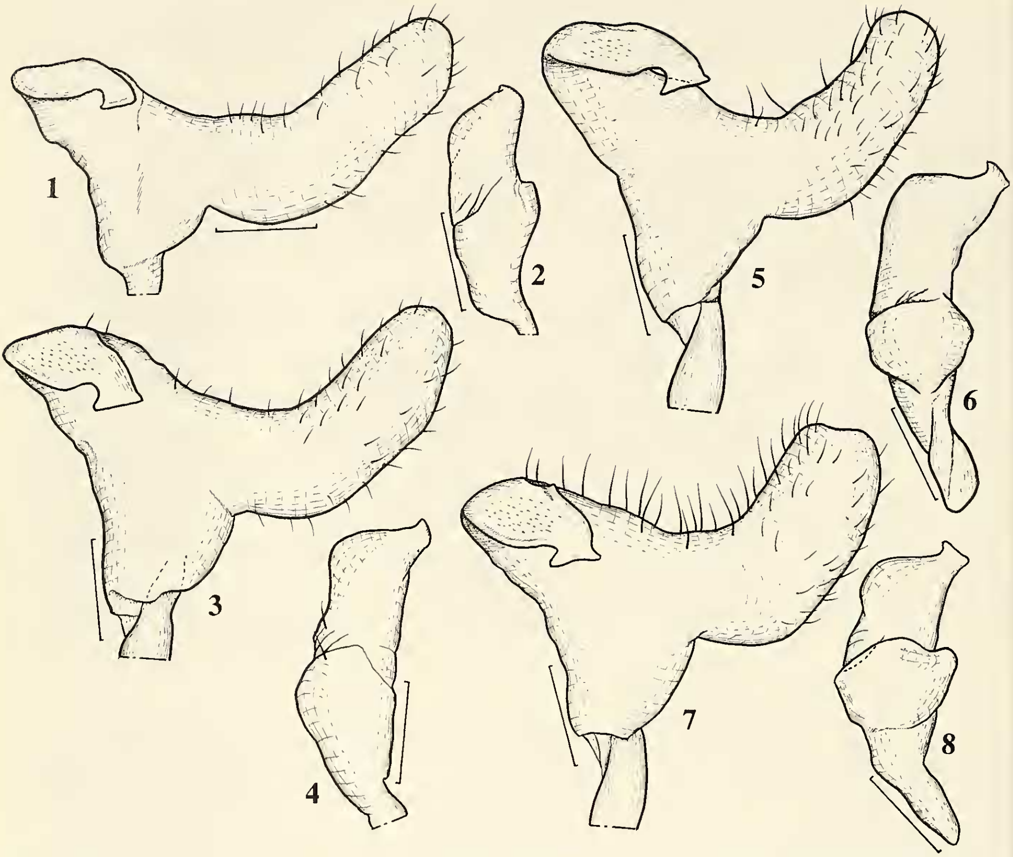
Deraeocoris olivaceus (Fabricius, 1777) is a conspicuous deraeocorine plant bug species, originally described from Germany, which is well known in Europe, because of its large size and predaceous habit. Stål (1858) described its relative, *D. brachialis*, from Irkutsk in southern Siberia, but this species was subsequently synonymised with *olivaceus* (Kerzhner 1988a). Although Kerzhner (1988b) referred to some different colour patterns in the specimens from the Russian Far East, he considered this as intraspecific variation. His treatment has been followed by subsequent authors (Miyamoto & Yasunaga 1989, Yasunaga 1990, Josifov 1992, Yasunaga & al. 1993, Lee & al. 1994, Vinokurov & Kanyukova 1995a, 1995b). Yasunaga (1994) illustrated the male genitalia of specimens with different coloration from Japan and the Russian Primorskij Kraj, and mentioned that, what had been called *olivaceus* in this region, includes at least three different species and is in need of revision.

Recently, through the courtesy of Prof. M. Josifov of Bulgarian Academy of Sciences, we obtained several specimens of 'true' European *olivaceus*, and, upon examination, the eastern Palearctic specimens were found to differ significantly in some structures from the European ones. Therefore, the populations occurring in eastern Eurasia (southern part of Siberia including Irkutsk, the Russian Far East, north-eastern China, Mongolia and Japanese Honshu) cannot be regarded as conspecific with those of Europe (= true *olivaceus*), but should be called *brachialis*. On the other hand, specimens from Shikoku and Kyushu, south-western Japan, correspond to neither *olivaceus* nor *brachialis* in having a bright red and densely pubescent dorsum, impunctate and setose scutellum, noticeably pubescent hemelytra and different structure of the male genitalia; they are considered to belong to an undescribed species. Further, one of the authors, Yasunaga, collected a pair of specimens with entirely blackish bodies from southern Primorskij Kraj, Russia. Such remarkable blackish specimens have previously been regarded as a variant of *olivaceus* (= *brachialis*) only (Kerzhner 1988b; Kerzhner pers. comm.), although distinct differences are found in the female antennal segmentI and male genitalia as described below; therefore, these specimens cannot be



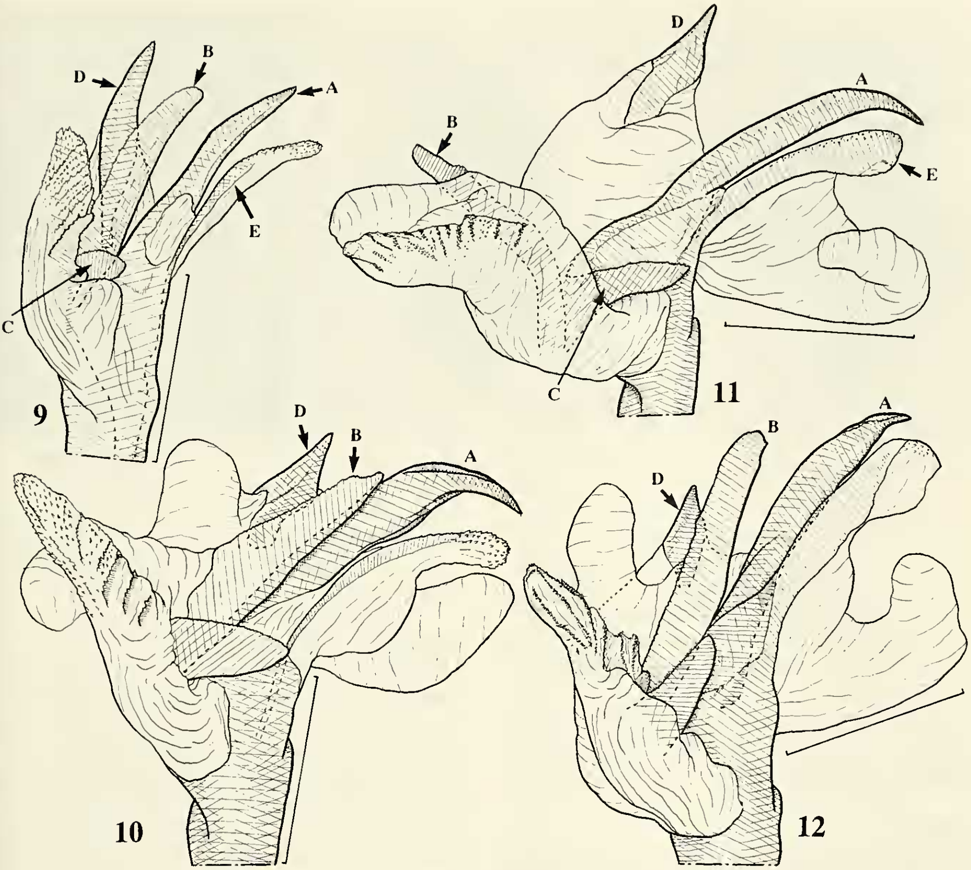
Figs. 1-8. Parameres of *Deraeocoris* spp. – 1-2, *D. olivaceus* from Bulgaria; 3-8, *D. brachialis*, 3-4, S. Primor'je, Russia; 5-6, Mt. Sasagamine, Niigata Pref., Honshu, Japan; 7-8, Mts. Yatsugatake, Nagano Pref., Honshu, Japan. – 1, 3, 5 & 7, left paramere; 2, 4, 6 & 8, right paramere. Scales: 0.2 mm.

considered conspecific with *olivaceus* or *brachialis*. In the present paper, the true *Deraeocoris olivaceus* (Fabricius), which is restricted to Europe and adjacent regions, is diagnosed, and the specific name, *D. brachialis* Stål, is reinstated as valid for the eastern Palearctic specimens. Two new species, *D. gibbantennatus* from southern Primorskij Kraj, Russia and *D. erythromelas* from Kyushu and Shikoku, Japan, are described. A key is provided to distinguish *D. olivaceus* and its allies, and the zoogeography is also discussed.

Material and methods

In general dried specimens were used. Depositories of material examined are abbreviated in the text as follows: Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan (ELKU); Biological Laboratory, Hokkaido University of Education, Sapporo, Japan (HUES); Dr. Miyamoto's personal collection, Fukuoka, Japan (MC); Museum of Nature and Human Activities, Hyogo, Japan (MNHA); National Institute of Agro-Environmental Science, Tsukuba, Japan (NIAES); Zoological Institute, National Science Museum, Tokyo, Japan (NSMT); Entomological Laboratory, University of Osaka Prefecture, Sakai, Japan (UOP); Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZMAS).

All measurements in the text are given in millimetres. In the synonymic listings only original references and selected references subsequent to Carvalho's catalogue (Carvalho 1957) are cited for each taxon (detailed synonymic listing provided by Schuh 1995).



Figs. 9-12. Vesicae of *Deraeocoris* spp. – 9, *D. olivaceus* from Bulgaria; 10-12, *D. brachialis*, 10, S. Primor'je, Russia; 11, Marunuma, Gunma Pref., Honshu, Japan; 12, Mts. Yatsugatake, Nagano Pref., Honshu, Japan. Scales: 0.5 mm.

Terms for descriptions of male genitalia

Male genitalia of the plant bugs form, needless to say, very important taxonomic characters, and it is necessary to describe and/or illustrate them properly. Because *Deraeocoris olivaceus* and allied species possess five homologous sclerites on the vesica, we use here alphabetical terms to avoid misunderstanding (see characters A-E in figs. 9-12, 20, 24).

Sclerite A is the most conspicuous, horn-like appendage, and may be interpreted as the 'spiculum'. The vesicae of *olivaceus* and allies are principally divided into three membranous lobes, and the first lobe is accompanied by two flat sclerites (B & C), which are sometimes fused together basally. 'Sclerite D' is situated on another lobe, tapered and pointed apically. The fifth sclerite (E) is a partly or entirely sclerotized extension of the third lobe. These five sclerites form important characters for the classification of *D. olivaceus* and allies.

TAXONOMY

Deraeocoris olivaceus (Fabricius)

(figs. 1-2, 9, 25)

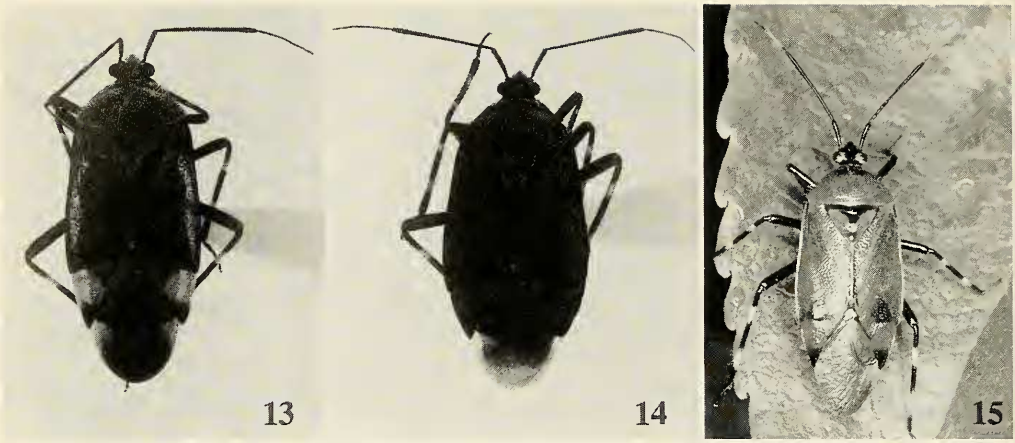
Cimex olivaceus Fabricius, 1777: 300.

Deraeocoris olivaceus – Reuter 1888: 648; Kiritschenko 1951: 159, fig. 166; Carvalho 1957: 71; Southwood & Leston 1959: 206; Leston & Woodroffe 1961: 188; Wagner & Weber 1964: 40; Wagner 1971: 36; Günther & Schuster 1990: 369; Melber & al. 1991: 92; Gorczyca 1992: 91; Schuh 1995: 615.

Deraeocoris brachialis – Kiritschenko 1951: 160.

Diagnosis

Recognised by the smallest body among the relatives (up to 10.7 mm in length; redescriptions below indicating the dimension tanges from 8.5-10.5 mm), narrow head, wide vertex (0.45-0.50 times as wide as head including eyes), generally short antennal segments, relatively incrassate antennal segment II (api-



Figs. 13-15. Dorsal habitus of *Deraeocoris* spp. – 13, *D. brachialis*; 14, *D. gibbantennatus*; 15, *D. erythromelas* on willow.

cal part more than 1.5 times as thick as base), bicolorous antennal segment III (basal part widely pale and apical part infuscate), and short legs. Very variable species in coloration. In Europe, its closest relative is *D. trifasciatus* (Linnaeus), from which *olivaceus* is easily separated by the significantly smaller size and different coloration.

Detailed descriptions were provided by several European authors (Reuter 1896; Wagner 1952, 1971; Wagner & Weber 1964, etc.).

Description

Male genitalia. – Parameres as in figs. 1-2; protuberance of left paramere not strongly curved (fig. 1). Vesica (fig. 9) comparatively small in general shape; sclerite A rather slender and straight; sclerite C short, accompanied with second triangular process; sclerite D elongate.

Dimensions. – ♂/♀ : Body length (from anterior apex of tylus to posterior rip of membrane) 9.90-10.68/ 10.02-10.20; head width including eyes 1.40-1.48/ 1.50-1.53; vertex width 0.65-0.68/ 0.75; length of antennal segment I 0.90-0.98/ 0.97-1.00, II 2.97-3.18/ 3.25-3.28, III 1.00-1.05/ 1.05-1.12, IV 0.63-0.72/ 0.70-0.73; rostral length 3.70-3.83/ ?; mesal pronotal length including collar 1.92-2.22/ 2.15-2.23; basal pronotal width 3.27-3.58/ 3.47-3.68; maximum width across hemelytra 4.15-4.63/ 4.50-4.73; length of hind femur 3.00-3.73/ 3.12-3.33, tibia 4.00-4.25/ 4.00-4.20, tarsus 1.07-1.18/ 1.12-1.18; length of hind tarsomere I 0.48-0.50/ 0.50-0.51, II 0.36-0.38/ 0.37-0.40, III 0.45-0.48/ 0.48-0.50.

Distribution

Europe: central part to the Mediterranean area, Britain, and the European part of Russia, west of the Ural range, and North Africa: Algeria. This species appears to be restricted to the western Palearctic Region.

Biology

D. olivaceus has been reported to be associated with Rosaceae, such as *Crataegus, Malus, Pirus* and *Prunus* (Wagner 1952, 1971, Wagner & Weber 1964), and in spite of being principally predaceous, it has been observed to feed on young hawthorn berries (*Crataegus*) (Southwood & Leston 1959). In Bulgaria, Dr. Josifov collected two males from *Quercus cerris* L.(Fagaceae), which we could not confirm as the host plant.

Material examined. – BULGARIA: 3♂, 2♀, Kalotina, 20.vi.1993, M. Josifov (HUES); 2♂, Plana u., Kokaljane, 1,000 m, on *Quercus cerris*, 23.vi.1968, M. Josifov (HUES).

Deraeocoris brachialis Stål sp. rev.

(figs. 3-8, 10-13, 25)

Deraeocoris brachialis Stål 1858: 185; Carvalho 1957: 61; Kulik 1965a: 170; Kulik 1965b: 50; Kerzhner 1978: 37.

Deraeocoris olivaceus – Kerzhner 1988a: 67; Kerzhner 1988b: 794; Miyamoto & Yasunaga 1989: 158; Yasunaga 1990: 665; Josifov 1992: 117; Yasunaga & al. 1993: 146, fig. 7b; Lee & al. 1994: 7; Yasunaga 1994: 41; Vinokurov & Kanyukova 1995a: 13; Vinokurov & Kanyukova 1995b: 85.

Diagnosis

Recognised by the enlarged body (more than 11 mm in most specimens), wide head, narrow vertex, long antennal segments, less incrassate antennal segment II, unicolorous dark antennal segment III (only extreme base rarely narrowly pale), and long legs. Very variable species in coloration.

This eastern Palearctic species is a close relative of *olivaceus*, from which it can be distinguished by the characters as diagnosed above and different structure of the male genitalia. Reuter (1896) provided a detailed redescription, in which he showed that *brachialis* is significantly larger than *olivaceus*. But his key is currently not applicable because the variable coloration was used as the key character.

Redescription

Body elongate oval (♂)/ oval and tumid (♀); dorsal surface usually brownish, shining, widely punctate. Head brown with dark symmetrical marking, or entirely darkened, shining, oblique and rather wide; vertex 0.37-0.45 (♂)/ 0.39-0.46 (♀) times as wide as head including eyes, with sparse, silky, very short pubescence; tylus, jugum, buccula and gena with dense, silvery, suberect pubescence. Antenna dark chestnut brown; segment I and basal part of II sometimes widely brown or reddish brown; segment II less incrassate toward apex, its apical part less than 1.5 times as wide as base; segments III and IV filiform, extreme base of segment III rarely pale; length of segments I-IV (♂/♀): 1.05-1.18/ 0.99-1.25, 3.40-3.78/ 3.23-4.00, 1.22-1.50/ 1.30-1.55, 0.76-0.90/ 0.77-0.88. Rostrum shiny dark chestnut brown, sometimes partly pale, reaching or slightly exceeding middle coxa.

Pronotum very variable in coloration, pale brown (usually with darkened calli) to widely darkened, shining, uniformly with dense, fuscous punctures and laterally with silky, erect pubescence, posterior margin usually impunctate; collar sombre yellowish brown to fuscous, shagreened or pruinose, bearing silky, erect pubescence; mesoscutum shiny fuscous, with shagreened lateral parts, bearing sericeous pubescence; scutellum shiny dark brown, with pale lateral and posterior margins forming v-shape, shallowly but distinctly punctate, bearing a few, silky, very short setae. Hemelytra brown, or pale, reddish, purplish or dark brown, shining, almost glabrous, with dense, dark punctures; apical part of corium widely infuscate; ventral surface of embolium densely pubescent; cuneus yellow, brown, orange or red, with always infuscate apical 1/3-1/2 parts; membrane sombre pale brown to brown, narrowly pale near apex of cuneus. Legs uniform with brownish, suberect setae; femora widely chestnut brown or dark brown, or pale brown with dark patches; tibiae reddish brown to fuscous, each with two yellow bands; tarsi dark brown, with dense, blush-like setae inward; length of hind femur, tibia and tarsus (♂/♀): 3.52-4.05/ 3.25-4.33, 4.75-5.33/ 4.42-5.63, 1.25-1.38/ 1.15-1.50; that of hind tarsomeres I-III (♂/♀): 0.50-0.60/ 0.54-0.70, 0.43-0.48/ 0.37-0.51, 0.48-0.60/ 0.44-0.60. Abdomen pale brown, reddish brown or dark chestnut brown.

Male genitalia. – Somewhat variable in shape. Parameres as in figs. 3-8; protuberance of left paramere distinctly curved. Vesical sclerite A is strong, broad and apically hooked; sclerite C developed; sclerite D rather shortened (figs. 10-12).

Dimensions. – ♂/♀: Body length 10.42-12.90/ 10.02-12.20; head width including eyes 1.57-1.80/ 1.57-1.75; vertex width 0.62-0.70/ 0.75-0.83; rostral length 3.65-4.25/ 3.62-4.28; mesal pronotal length including collar 2.25-2.48/ 2.00-2.73; basal pronotal width 3.72-4.05/ 3.42-4.45; maximum width across hemelytra 4.67-5.30/ 4.47-5.50.

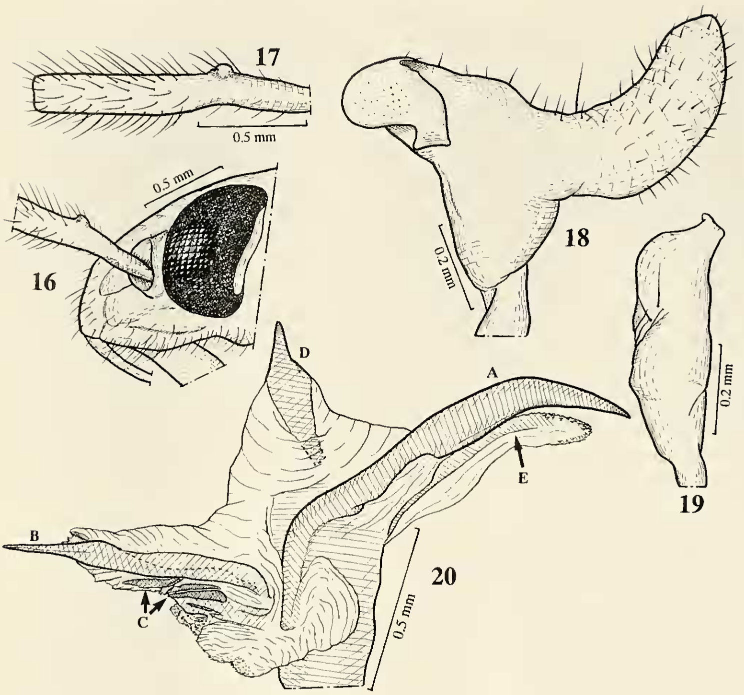
Distribution

Russia (possibly east of Altai and south of Stanovoj ranges: South Siberia including Irkutsk and Tuva, continental Far East and South Sakhalin), Japan (North and Central Honshu), Mongolia, North-east China, North- and South-Korea.

Biology

Kerzhner (1978) recognised *Salix* sp. (Salicaceae) as its host plant, and Yasunaga (1994) also recorded willow (*Salix* spp.) and alder (*Alnus* spp., Betulaceae). Predation on larvae of chrysomelid beetles (e.g., *Gonioctena japonica* Chujo et Kimoto, 1960 on alder and *Chrysomela vigintipunctata* (Scopoli, 1763) on willow) has been frequently observed, and cannibalism was also reported (Yasunaga 1990).

Material examined. – Russia: S. Primorskij Kraj: 1 ♀, Ussurijsk Reserve, 15.vii.1990, T. Saigusa (HUES); 1♂, Ussurijsk Reserve, W. border, 12-13.vii.1993, light trap, T. Yasunaga (HUES); 24♂, 16♀, 17 km SW of Krounovka, nr. Mt. Medvezh'ja, on alder & willow, 5-9.vii.1993, T. Yasunaga (HUES); 2♂, Rjazanovka, Khasanskij Dist., 26-27.vii.1993, light trap, T. Yasunaga (HUES). – China: 1♂, N. Manchuria (= current Heilongjiang Prov. of NE. China), 1940, A. Loukashikin (NIAES). – Japan: Honshu: 1♂, 1♀, Mt. Sasagamine, Niigata Pref., 20-25.vii.1993, S. Yoshizawa (HUES); 1♀, Nikko, Tochigi Pref., 19.vii.1949, J. Aoki (NIAES); 1♀, same locality, 14.vi.1950, M. Yano (NIAES); 2♂, same locality, 17-19.vii.1959, T. Maenami (NIAES); 1♂, Nebasawa, Oku-nikko, Tochigi Pref., 11.vii.1937, G. Yamamoto (NIAES); 1♀, Ozegahara, Gunma Pref., 9.vii.1951, H. Hasegawa (NIAES); 3♂, 3♀, same locality, 9-10.vii.1978, M. Tomokuni (NSMT); 1♀, Fujimishita, nr. Ozegahara, Gunma Pref., 22.vii.1987, Y. Notsu (NSMT); 1♂, Marunuma, Gunma Pref., 7.vii.1984, M. Hayashi (HUES); 1♂, 4♀, Mt. Kanayama, Yamanashi Pref., 6.vi.1952, M. Ohno (NIAES); 1♀, Masutomi, Yamanashi Pref., 28.vii.1957, S. Kimoto (MC); 1♀, Daimonzawa, Mt. Akadake, 2,000-2,500 m alt., Mts. Yatsugatake, Yamanashi Pref., 30.vii.1987, T. Yasunaga (HUES); 4♂, Nippara, Tokyo, 12.vii.1986, M. Tomokuni (NSMT); 1♂, Komoro, Nagano Pref., 29.vii.1959, T. Maenami (NIAES); 1♀, Omachi, Nagano Pref., 26.vi.1977, M. Owada (NSMT); 1♂, Mikasa Park, Karuizawa, Nagano Pref., 31.vii.1968, H.



Figs. 16-20.

Deraeocoris gibbantennatus. – 16, female head in left lateral view; 17, female antennal segment I; 18, left paramere; 19, right paramere; 20, vesica.

Ono (NSMT); 1♂, Ueda C., Nagano Pref., vi.1934, S. Miyamoto (ELKU); 2♂, 2♀, Todai, Kami-ina, Nagano Pref., 8-11.vii.1978, M. Owada (NSMT); 1♀, Sugadaira, Nagano Pref., 18.viii.1956, K. Baba (NIAES); 1♂, Shiga Plateau, Nagano Pref., 6.viii.1974, Y. Hori (NSMT); 1♀, same locality, 3-6.viii.1982, M. Sato (NSMT); 3♂, 4♀, Mt. Azusayama, Kawakami Vil., Nagano Pref., 5.vii.1980, Y. Kurosawa (NSMT); 3♂, 1♀, Minoto, Mt. Akadake, 2,000-2,500 m alt., Mts. Yatsugatake, Nagano Pref., 27.vii.1987, T. Yasunaga (HUES); 1♂, Inakoba, Mts. Yatsugatake, Nagano Pref., 18.vii.1939, H. Hasegawa (NIAES); 2♂, Sanjiro, Utsukushigahara, Nagano Pref., 30.vii.1954, K. Kai (NIAES); 1♀, Shimashima Valley, Nagano Pref., 3-5.viii.1940, K. Kurosa (NIAES); 1♂, same locality, 7.viii.1955, H. Hasegawa (NIAES); 1♀, Iwana-dome, Shimashima Valley, Nagano Pref., 14.vii.1982, Y. Abe (HUES); 1♀, Tokugo Pass, Nagano Pref., 7.viii.1955, H. Hasegawa (NIAES); 3♀, Kamikochi, Japan Alps, Nagano Pref., 21.vii.1917, T. Esaki (ELKU); 1♂, 2♀, same locality, 15.vii.1945, M. Yano; 2♀, same locality, 20.viii.1936, K. Kurosa (NIAES); 1♀, same locality, 12.viii.1952, T. Nakane (NIAES); 2♂, 2♀, same locality, 3-7.viii.1955, I. Hattori (NIAES); 1♀, same locality & collector, 18-19.vii.1956 (NIAES); 2♂, 3♀, same locality & collector, 14-18.vii.1960, I. Hattori (NIAES); 2♀, same locality, on alder, 21.vii.1957, M. Ohno (NIAES); 1♀, same locality, 3.viii.1956, M. Sato (NSMT); 6♂, 10♀, Mt. Nyugasa, Nagano Pref., 29-31.vii.1962, S. Miyamoto (MC); 1♀, Mt. Senjodake, Nagano Pref., 3.viii.1958, H. Yamamoto (MC); 1♂, Isedaki, Komagatake, Nagano Pref., 1.viii.1962, S. Miyamoto (MC); 2♂, Nagawa Vil., Nagano Pref., 21.vii.1994, Y. Sawada & T. Ueda (UOP); 1♂, 1♀, Kiso-Ontake, Nagano Pref., 20.vii.1952, H. Hasegawa (NIAES); 2♀, Hirayu, Gifu Pref., 22-23.vii.1946, K. Ohbayashi (NSMT); 1♀, same locality, 26.vii.1986, S. Miyakawa (NSMT); 1♂, Mt. Wasamata, Nara Pref., 3.viii.1995, T. Hirowatari (UOP); 1♂, 2♀, Kobe C., Hyogo Pref., 20.vi.1940, K. Kurosa (NIAES).

Deraeocoris gibbantennatus sp. n.
(figs. 14, 16-20, 25)

Deraeocoris olivaceus – Kerzhner 1988b: 794; Yasunaga 1994: 43, fig. 14.

Type Material. – Holotype ♂, 17 km SW of Krounovka, near Mt. Medvezh'ja, S. Primorskij Kraj, Russia, on *Alnus* sp., 5-7.vii.1993, T. Yasunaga (ZMAS). – Paratype: 1♀, same data as for holotype, 8-9.vii.1993 (HUES).

Diagnosis

This species is easily distinguished from other relatives by the entirely blackish dorsum (fig. 14) and peculiar hump-like projection on the female antennal segment I (figs. 16-17). The shape of the vesical sclerite is also unique to this species.

Description

Body almost entirely shiny black, oblong-oval (♂)/oval (♀); dorsal surface distinctly punctate; ventral surface uniformly darkened. Head black, shining, with silvery, suberect, short pubescence; vertex somewhat pale near inner margin of eye, relatively narrow, 0.36-0.37 times (♂)/ 0.43 times (♀) as wide as head including eyes. Antenna entirely blackish brown, densely setose; ♀ segment I with a dorsal, hump-like projection at basal 1/4; segment II rather incrassate toward apex, apical part 1.6-1.7 times as thick as base; segments III and IV filiform; length of segments I-IV (♂/♀): 1.25/ 1.25, 3.88/ 3.96, 1.50/ 1.48, 0.83/ 0.83. Rostrum shiny dark chestnut brown, reaching middle coxa.

Pronotum black, shining between punctures, with brown, upright setae laterally, posterior margin somewhat pale; collar shagreened or pruinose, bearing silky, erect pubescence; mesoscutum black, shagreened laterally, with sparse, silky, short pubescence; scutellum shiny dark chestnut brown, with yellow extreme apex, timid, punctate, bearing very sparse, silky, short pubescence. Hemelytra unicolorous shiny black, densely punctate, with silky, short pubescence along lateral margin; ventral surface of embolium densely pubescent. Leg dark brown, densely setose; each tibia with two yellowish bands; tarsi with dense, blush-like setae inward; length of hind femur, tibia and tarsus (♂/♀): 4.00/ 4.03, 5.25/ 5.33, 1.40/ 1.43; that of hind tarsomeres I-III: 0.55/ 0.60, 0.48/ 0.52, 0.53/ 0.61. Abdomen entirely shiny blackish.

Male genitalia. – Parameres as in figs. 18-19. Vesica apparently specialised in form (fig. 20); sclerite A elongate, tapered at apex; sclerite B narrow, widely fused with a membranous lobe; sclerite C reduced, divided into several smaller plates; sclerite C weak.

Dimensions. – ♂/♀: Body length 12.90/ 11.94; head width including eyes 1.78/ 1.74; vertex width 0.65/ 0.75; rostral length 4.00/ 4.28; mesal pronotal length including collar 2.35/ 2.63; basal pronotal width 4.00/ 4.35; maximum width across hemelytra 5.08/ 5.75.

Etymology

From Latin, gibba or gibbus (= hump) in combination with antenna, referring to the characteristic hump-like projection exhibited on the female antennal segment I.

Distribution

Russian Far East (S. Primorskij Kraj).

Biology

D. gibbantennatus was found on *Alnus* sp. (Betulaceae), with which it appears to be associated. It was collected together with *D. brachialis*, but in lower population densities.

Deraeocoris erythromelas **sp. n.**

(figs. 15, 21-25)

Deraeocoris olivaceus – Yasunaga & al. 1993: 146, fig. 7a; Yasunaga 1994: 42, fig. 15.

Type material. – Holotype ♂, Momiki, 600-700 m alt., Izumi Vil., Kumamoto Pref., Kyushu, Japan, at light, 6.vii.1991, K. Yahiro (HUES). – Paratypes: Shikoku: 1♂, Nishikuma, Monobe Vil., Kochi Pref., 30.vii.1994, M. Takai (HUES); 1♀, Teragawa, Hongawa Vil., Kochi Pref., light trap, 18.vii.1993, I. Yamashita (HUES); 1♂, same locality and collector, 25.vii.1991 (UOP); 1♀, Hongawa Vil., 800-1,400 m alt., Kochi Pref., on *Betula* sp., 23.vii.1996, T. Yasunaga (HUES); 1♀, Mt. Tsurugi, Tokushima Pref., light trap, 10.vii.1993, I. Yamashita (HUES); 1♀, Mt. Odamiyama, Ehime Pref., 12.vii.1994, M. Takai (HUES). – Kyushu: 1♂, Mt. Shiratori, Izumi Vil., Kumamoto Pref., 21.vi.1987, R. Noda (HUES); 1♀, same locality, 19.vii.1992, Y. Nakatani (UOP); 1♀, Mt. Yamaingiri 1,100 m alt., Izumi Vil., Kumamoto Pref., on *Salix* sp., 28.vi.1992, T. Yasunaga (fig. 15, HUES); 1♂, same locality, light trap, 16.vii.1994, R. Matsumoto (HUES); 1♀, Mt. Sobo, Oita Pref., 25.vii.1978, Y. Shono (MNHA); 1♀, Kamihori, Miyazaki Pref., 15.vii.1967, S. Tawara (MC).

Diagnosis

This species is easily distinguished from other relatives by the bright red and partly infuscate dorsum, silky suberect pubescence on the impunctate scutellum, and uniformly pubescent hemelytra, in addition to having a quite restricted distribution.

Description

Body elongate oval, large; dorsal surface noticeable bright red, partly or sometimes widely infuscate, provided with silky, suberect pubescence; ventral surface widely darkened. Head dark chestnut brown, shining, with silky, suberect pubescence; vertex with a pale spot near inner margin of each eye, comparatively wide, 0.43-0.44 (♂)/ 0.50-0.52 (♀) times as wide as head including eyes; tylus, jugum, buccula and gena bearing rather dense, silky, long pubescence. Antenna dark chestnut brown, with dense, erect, long setae; apical part of segment II more than 1.5 times as thick as base; segments III and IV somewhat paler, filiform; length of segments I-IV (♂/♀): 1.12-1.15/ 1.22-1.28, 3.52-3.75/ 3.50-4.13, 1.18-1.25/ 1.26-1.40, 0.75-0.78/ 0.89-0.91. Rostrum shiny dark chestnut brown, reaching middle coxa.

Pronotum usually bright red, shining, sometimes tinged with purple or brown, uniformly bearing brownish, erect pubescence, with dark punctures; calli sometimes infuscate; collar dark grey, shagreened, with dense, brownish, erect setae; mesoscutum black-

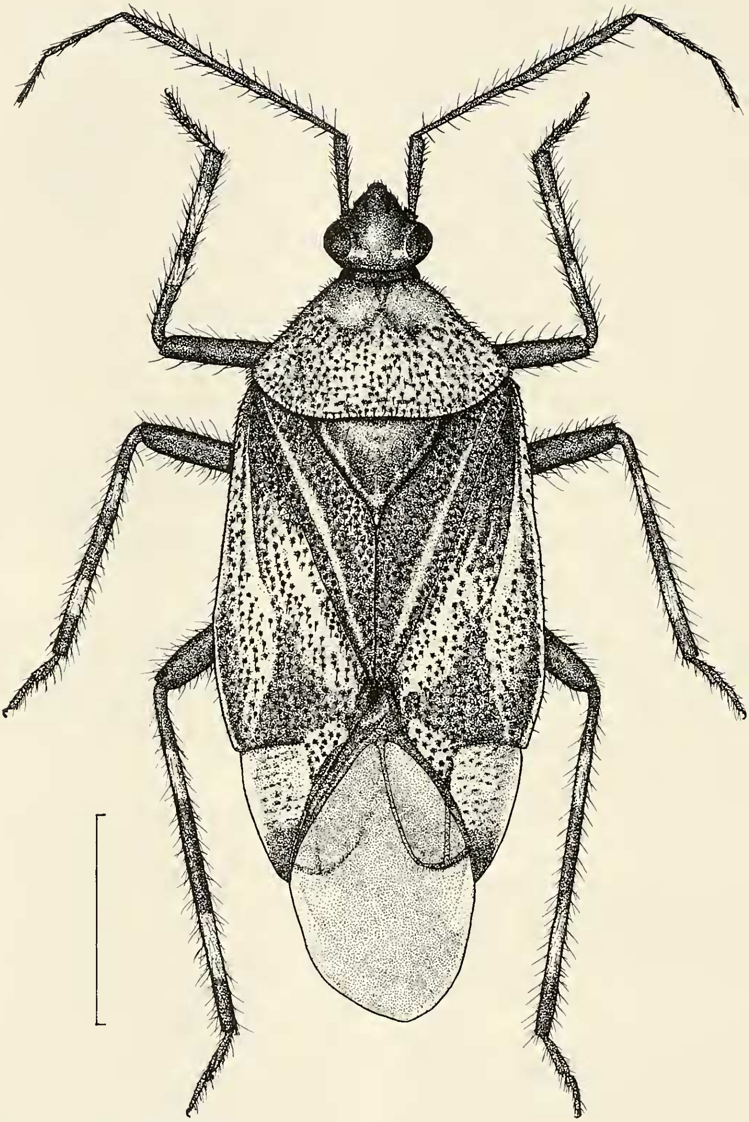
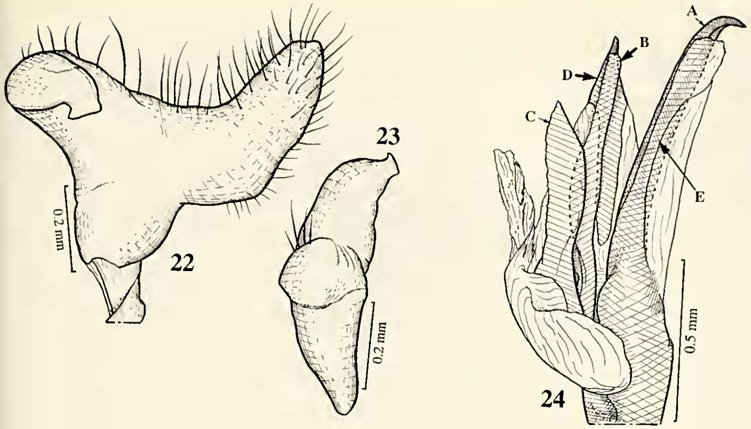


Fig. 21. *Deraeocoris erythromelas*, dorsal habitus. Scale: 3 mm.



Figs. 22-24.

Male genitalia of *Deraeocoris erythromelas*. – 22, left paramere; 23, right paramere; 24, vesica.

ish, laterally with greyish pollinosity, bearing sparse, silky pubescence; scutellum red, shining, triangularly darkened medially, impunctate or very shallowly punctate, uniformly clothed with silky, erect pubescence. Hemelytra shiny red, sometimes tinged with purple or brown, punctate, uniformly clothed with silky, suberect pubescence; corium and clavus partly or sometimes widely infuscate; cuneus bright red, with darkened apical 1/3-1/2 parts; membrane sombre greyish brown, with a pale spot near apex of cuneus. Leg dark chestnut brown; femora and tibiae with dense, brownish, erect setae; each tibia with two yellowish white bands; tarsi with dense, blushlike setae; length of hind femur, tibia and tarsus (♂/♀): 3.65-3.75/ 3.80-4.25, 4.72-4.93/ 4.97-5.38, 1.20-1.25/ 1.30-1.38; that of hind tarsomeres I-III (♂/♀): 0.48-0.50/ 0.57-0.60, 0.42-0.46/ 0.44-0.48, 0.49-0.53/ 0.55-0.60. Abdomen shiny dark brown.

Male genitalia. – Parameres (figs. 22-23) distinctly setose; left paramere densely furnished with long sensory setae (fig. 22). Vesical sclerites A and B long and slender; sclerite C well developed; sclerite D extended basally (fig. 24).

Dimensions. – ♂/♀: Body length 10.98-12.00/ 10.92-12.03; head width including eyes 1.60-1.65/ 1.66-1.73; vertex width 0.70-0.73/ 0.85-0.88; rostral length 3.57-3.93/ 3.82-4.08; mesal pronotal length including collar 2.35-2.43/ 2.57-2.68; basal pronotal width 3.85-3.90/ 3.97-4.38; maximum width across hemelytra 4.81-4.99/ 5.22-5.88.

Etymology

From Greek erythro- (= red) and melas (= black), referring to the bright red and partly infuscate body of this new species.

Distribution

Japan (central montane areas of Shikoku and Kyushu).

Biology

D. erythromelas has been found on *Betula* sp. (Betulaceae) and *Salix* spp. (Salicaceae). Predation on larvae of the chrysomelid beetle, *Chrysomela vigintipunctata* (Scopoli, 1763) (Coleoptera) on willow was observed in Kyushu. A last-instar nymph was found to have been parasitized by an undetermined nematode (Yasunaga, unpublished data).

KEY TO SPECIES OF *D. olivaceus* AND ALLIES

1. Scutellum shiny and impunctate, with silky, suberect pubescence; hemelytra distinctly pubescent . . . . *D. erythromelas*

–. Scutellum distinctly punctate, glabrous; hemelytra lacking noticeable pubescence except on embolium 2

2. Dorsal surface entirely shiny black; ♀ antennal segment I with a peculiar dorsal hump-like projection . . . . *D. gibbantennatus*

– Dorsal surface partly or widely reddish, brownish or yellowish; ♀ antennal segment I lacking such projection 3

3. Body larger, usually more than 11 mm in length; antennal segment I longer, more than 1 mm; antennal segment III unicolorously darkened, or only extreme base rarely pale; eastern Palearctic species found on Salicaceae and Betulaceae . . *D. brachialis*

– Body smaller, up to 10.7 mm in length; antennal segment less than 1 mm; antennal segment III bicolorous, dark with widely pale base; western Palearctic species associated mainly with Rosaceae . . . . *D. olivaceus*

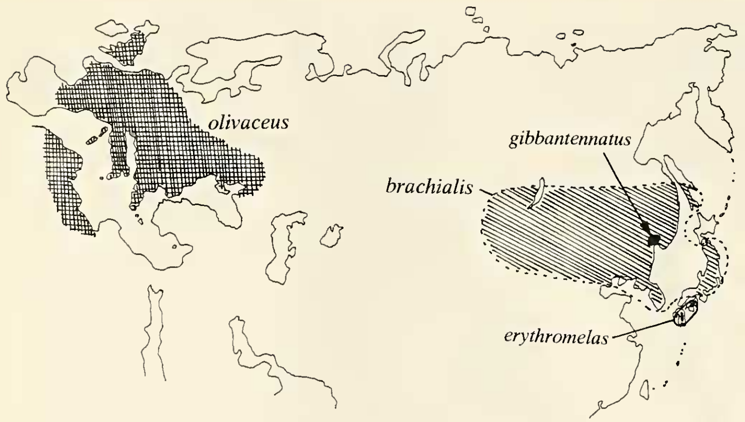


Fig. 25.

Distribution of *Deraeocoris olivaceus* and allies.

Zoogeography (fig. 25)

The four treated species have in the past been represented as a single species, *olivaceus*, which was considered to be a widely distributed Palearctic species. After a careful check of the previous distributional records, we realized that *D. olivaceus, D. brachialis* and *D. erythromelas* are obviously allopatrically distributed. *D. olivaceus* is restricted to the western Palearctic Region including the Mediterranean area, *D. brachialis* is distributed in southern Siberia, the Russian Far East, Mongolia, the Korean Peninsula and Honshu, Japan, and *D. erythromelas* has the southernmost distribution, being endemic to central montane areas of Shikoku and Kyushu Islands, south-western Japan. Only *D. gibbantennatus* was found sympatric with *brachialis* in the Russian Primorskij Territory.

Of the four species, *D. olivaceus* and *D. brachialis* are the most closely related species. However, none of these has been reported from the region between the Ural and Altai ranges. The mountains are considered to form a barrier, dividing the distribution ranges of the western *D. olivaceus* and eastern *brachialis.*

Our observations and previous reports indicate that these two species have different host preferences; *D. olivaceus* is associated with rosaceous host plants (Southwood & Leston 1959; Wagner 1952, 1971; Wagner & Weber 1964), while *D. brachialis* has been found only on alder (Betulaceae) and willow (Salicaceae). As pointed out by Todo & Yasunaga (1996) and Yasunaga (1996), many deraeocorine species, in spite of being predaceous, live on restricted plant species. The different preference for plant species may be a diagnostic character.

Kerzhner (1988b) regarded specimens, here named as *D. gibbantennatus*, as conspecific with *D. brachialis*, but a peculiar hump-like dorsal projection on the female antennal segment I is considered to be an autapomorphy for *gibbantennatus* (see figs. 16-17). The shape of sclerites B and C on the male vesica is also unique to *gibbantennatus*, which is, therefore, here regarded to be a good species.

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